

Remarks

Reconsideration and allowance of the subject application are respectfully solicited.

Claims 1-5 and 7-11 remain pending in the application. Claims 1 and 11 are independent and have been amended herein.

Claim 11 was rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,956,055 (Gibson et al.). Claims 1, 2, 4, 5 and 8-10 were rejected under 35 U.S.C. § 103 as being unpatentable over Gibson et al. in view of U.S. Patent No. 6,227,644 (Perner). Claims 1-4 and 7-10 were rejected under § 103 as being unpatentable over Gibson et al. in view of U.S. Patent No. 5,448,269 (Beauchamp et al.). These rejections are respectfully traversed.

As is recited in independent Claim 1, the present invention relates to a printing apparatus for printing an image on a printing medium while relatively moving at least one of a printing head provided with an array of a plurality of printing elements and the printing medium. The apparatus includes a carriage, detection means and control means. The carriage mounts the printing head, and is movable relative to the printing medium in a scanning direction crossing the array of the plurality of printing elements. The detection means is mounted on the carriage and detects printing positions of an array of printed pixels corresponding to the array of the plurality of printing elements. The detecting means also detects printed pixels printed by any of the plurality of printing elements. The control means controls drive timing of the plurality of printing elements according to detection results of the detection means so as to make printing positions of

subsequently printed pixels close to a predetermined center position. The control means controls the drive timing of any of the printing elements determined from the plurality of printing elements on the basis of displacement amounts of printing positions of printed pixels so that a deviation amount between printing positions of printed pixels corresponding to one end side and the other end side of the array of printing elements is equal to or smaller than a predetermined amount.

As is recited in independent Claim 11, the present invention relates to a printing method for printing an image on a printing medium while relatively moving at least one of a printing head provided with an array of a plurality of printing elements and the printing medium. The method includes the steps of relatively moving at least one of the printing head and the printing medium in a scanning direction crossing the array of the printing elements so that an array of printed pixels corresponding to the array of the printing elements is printed on the printing medium, detecting printing positions of the array of printed pixels by detecting printed pixels printed by any of the plurality of printing elements and controlling drive timing of the plurality of printing elements according to detection results of the printing positions so as to make printing positions of subsequently printed pixels close to a predetermined center position. The controlling step controls drive timing of any of the printing elements determined from the plurality of printing elements on the basis of displacement amounts of printing positions of printed pixels so that a deviation amount between printing positions of printed pixels corresponding to one end side and the other end side of the array of printing elements is equal to or smaller than a predetermined amount.

Gibson et al. relates to a method for compensating for skewed printing in an ink jet printer. Gibson et al. can minimize the offset between a bottom ink dot placement associated with a first scan of a recording head in a first direction 42 and a top ink dot placement location associated with a second, opposite scan 44. To do so, the array of ink emitting orifices is segmented into at least two vertically adjacent segments of orifices as shown in Figure 4. The dot placement locations associated with at least one of the segments is shifted in a direction transverse to the advancing direction. The ink dot placement locations of the other segments remain unchanged. The offset or error E between the two scans can be changed from 1 PEL as shown in Figure 3 to  $\frac{1}{2}$  PEL as shown in Figure 4.

However, because in Gibson et al. the drive timing of the printing elements is controlled in groups, Gibson et al. cannot disclose or suggest detecting printed pixels printed by any of the plurality of printing elements, and controlling driving timing of any of the printing elements determined from the plurality of printing elements on the basis of displacement amounts of printing positions of printed pixels, as is recited in independent Claims 1 and 11. Further, because in Gibson et al. the drive timing of the printing elements is controlled so as to decrease the displacement E between a position of a bottommost ink dot in ink line 38 and a topmost ink dot in ink line 40, Gibson et al. cannot disclose or suggest controlling drive timing of any of the printing elements so that a deviation amount between printing positions of print pixels corresponding to one end side and the other end side of the array of printing elements is equal to or smaller than a predetermined amount, as is also recited in the independent claims.

Thus, Gibson et al. fails to disclose or suggest important features of the present invention recited in independent Claims 1 and 11.

Beauchamp et al. relates to an ink jet printer including a printhead and an optical sensor for sensing a test pattern. As discussed previously, Beauchamp et al. controls drive timings of all the plurality of printing elements based on the scanning speed and bending of a platen. Accordingly, Beauchamp et al. does not control the drive timing of any of the printing elements determined from the plurality of printing elements on the basis of displacement amounts of printing positions and fails to remedy the deficiencies of Gibson et al. noted above with respect to the independent claims.

Perner describes a printer having an image array 15 with two imaging detectors 16 for each nozzle, but also fails to remedy the deficiencies of the citations noted above with respect to independent Claims 1 and 11.

Thus, independent Claims 1 and 11 are patentable over the citations of record. Reconsideration and withdrawal of the §§ 102 and 103 rejections are respectfully requested.

For the foregoing reasons, Applicants respectfully submit that the present invention is patentably defined by independent Claims 1 and 11. Dependent Claims 2-5 and 7-10 are also allowable, in their own right, for defining features of the present invention in addition to those recited in their respective independent claims. Individual consideration of the dependent claims is requested.


This Amendment After Final Rejection is an earnest attempt to advance prosecution and reduce the number of issues, and is believed to clearly place this

application in condition for allowance. This Amendment was not earlier presented because Applicants earnestly believed that the prior Amendment placed the subject application in condition for allowance. Accordingly, entry of this Amendment under 37 CFR 1.116 is respectfully requested.

Applicants submit that the present application is in condition for allowance. Favorable reconsideration, withdrawal of the rejections set forth in the above-noted Office Action, and an early Notice of Allowance are requested.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

  
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